

# WEST Search History

DATE: Monday, December 16, 2002

<u>Set Name</u>	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u>
side by side		result set	
<i>DB=JPAB; PLUR=YES; OP=OR</i>			
L11	2000308301	1	L11
<i>DB=DWPI; PLUR=YES; OP=OR</i>			
L10	2000308301	1	L10
<i>DB=USPT; PLUR=YES; OP=OR</i>			
L9	L8 and lithium	26	L9
L8	L7 and (battery or electrochemical) and (electrode or anode or cathode)	35	L8
L7	olivine	827	L7
<i>DB=DWPI; PLUR=YES; OP=OR</i>			
L6	2001842483	0	L6
L5	olivinic	5	L5
<i>DB=USPT; PLUR=YES; OP=OR</i>			
L4	olivinic	2	L4
L3	L2 and (phosphorous or phosphate or phosphoric)	63	L3
L2	L1 and (fe or iron)	318	L2
L1	((429/224 )!.CCLS. )	811	L1

END OF SEARCH HISTORY

FILE 'HOME' ENTERED AT 15:20:39 ON 16 DEC 2002

=> file reg			
COST IN U.S. DOLLARS	SINCE FILE	TOTAL	
	ENTRY	SESSION	
FULL ESTIMATED COST	0.21	0.21	

FILE 'REGISTRY' ENTERED AT 15:20:49 ON 16 DEC 2002  
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Property values tagged with IC are from the ZIC/VINITI data file  
provided by InfoChem.

STRUCTURE FILE UPDATES: 15 DEC 2002 HIGHEST RN 476300-36-4  
DICTIONARY FILE UPDATES: 15 DEC 2002 HIGHEST RN 476300-36-4

TSCA INFORMATION NOW CURRENT THROUGH MAY 20, 2002

Please note that search-term pricing does apply when  
conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for details.

Experimental and calculated property data are now available. See HELP  
PROPERTIES for more information. See STNote 27, Searching Properties  
in the CAS Registry File, for complete details:  
<http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf>

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (0.5-1)/Fe and (0.01-0.95)/Ti and (4)/(PO)  
MISSING OPERATOR

=> e (0.01-2)/Li and (0.5-0.95)/Mn and (0.5-1)/Fe and (0.01-0.95)/Ti and (4)/(PO)  
'(PO)' IS NOT A VALID EXPAND FIELD CODE FOR FILE 'REGISTRY'  
The indicated field code is not available for EXPAND in this  
file. To see a list of valid EXPAND field codes, enter HELP  
SFIELDS at an arrow prompt (=>).

=> e (0.01-2)/Li and (0.5-0.95)/Mn and (0.5-1)/Fe and (0.01-0.95)/Ti and (1)/P and  
(4)/O  
'(0.01-2)/LI AND (0.5-0.95)/MN AND (0.5-1)/FE AND (0.01-0.95)/TI AND (1)/P AND (4)'  
IS NOT A VALID NUMERIC VALUE  
Only valid numeric terms can be EXPANDED in numeric fields. Valid  
numeric terms are zero and any term with an absolute value between 1  
E-78 and 1 E74. Non-numeric characters are not permitted in the  
EXPAND command for numeric fields. To see a list of numeric and text  
fields in the current file, enter "HELP SFIELDS" at an arrow  
prompt (=>).

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (0.5-1)/Fe and (0.01-0.95)/Ti and (1)/P and  
(4)/O  
87622 (0.01-2)/LI  
6916 (0.5-0.95)/MN  
635116 (0.5-1)/FE  
34621 (0.01-0.95)/TI  
815165 (1)/P  
2967528 (4)/O  
L1 0 (0.01-2)/LI AND (0.5-0.95)/MN AND (0.5-1)/FE AND (0.01-0.95)/TI  
AND (1)/P AND (4)/O

=> s LiMnFeTiPO4  
L2 0 LIMNFTIPO4

```

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (1)/P and (4)/O
    87622 (0.01-2)/LI
    6916 (0.5-0.95)/MN
    815165 (1)/P
    2967528 (4)/O
L3      45 (0.01-2)/LI AND (0.5-0.95)/MN AND (1)/P AND (4)/O

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (0.01-0.95)/Ti and (1)/P and (4)/O
    87622 (0.01-2)/LI
    6916 (0.5-0.95)/MN
    34621 (0.01-0.95)/TI
    815165 (1)/P
    2967528 (4)/O
L4      0 (0.01-2)/LI AND (0.5-0.95)/MN AND (0.01-0.95)/TI AND (1)/P AND
        (4)/O

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (0.01-0.95)/Ag and (1)/P and (4)/O
    87622 (0.01-2)/LI
    6916 (0.5-0.95)/MN
    2422 (0.01-0.95)/AG
    815165 (1)/P
    2967528 (4)/O
L5      0 (0.01-2)/LI AND (0.5-0.95)/MN AND (0.01-0.95)/AG AND (1)/P AND
        (4)/O

=> d 13 1-5

```

L3 ANSWER 1 OF 45 REGISTRY COPYRIGHT 2002 ACS  
RN 475273-80-4 REGISTRY  
CN Cobalt iron lithium manganese nickel phosphate ((Co,Fe,Mn,Ni)Li(PO4))  
 (9CI) (CA INDEX NAME)  
MF Co . Fe . Li . Mn . Ni . O4 P  
AF Co0-1 Fe0-1 Li Mn0-1 Ni0-1 O4 P  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Co	0 - 1	7440-48-4
Ni	0 - 1	7440-02-0
Mn	0 - 1	7439-96-5
Li	1	7439-93-2
Fe	0 - 1	7439-89-6

1 REFERENCES IN FILE CA (1962 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1962 TO DATE)

L3 ANSWER 2 OF 45 REGISTRY COPYRIGHT 2002 ACS  
RN 474903-03-2 REGISTRY  
CN Iron lithium manganese phosphate (Fe0.1LiMn0.9(PO4)) (9CI) (CA INDEX  
 NAME)  
MF Fe . Li . Mn . O4 P  
AF Fe0.1 Li Mn0.9 O4 P  
CI TIS  
SR CA  
LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
O4P	1	14265-44-2

Mn	0.9	7439-96-5
Li	1	7439-93-2
Fe	0.1	7439-89-6

1 REFERENCES IN FILE CA (1962 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1962 TO DATE)

L3 ANSWER 3 OF 45 REGISTRY COPYRIGHT 2002 ACS  
 RN 474903-00-9 REGISTRY  
 CN Iron lithium manganese phosphate ( $Fe0.3LiMn0.7(PO4)$ ) (9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN Phosphoric acid, iron(2+) lithium manganese(2+) salt (10:3:10:7)  
 DR 371145-94-7  
 MF Fe . Li . Mn . O4 P  
 AF Fe0.3 Li Mn0.7 O4 P  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mn	0.7	7439-96-5
Li	1	7439-93-2
Fe	0.3	7439-89-6

1 REFERENCES IN FILE CA (1962 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1962 TO DATE)

L3 ANSWER 4 OF 45 REGISTRY COPYRIGHT 2002 ACS  
 RN 474902-99-3 REGISTRY  
 CN Iron lithium manganese phosphate ( $Fe0.35LiMn0.65(PO4)$ ) (9CI) (CA INDEX NAME)  
 MF Fe . Li . Mn . O4 P  
 AF Fe0.35 Li Mn0.65 O4 P  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mn	0.65	7439-96-5
Li	1	7439-93-2
Fe	0.35	7439-89-6

1 REFERENCES IN FILE CA (1962 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1962 TO DATE)

L3 ANSWER 5 OF 45 REGISTRY COPYRIGHT 2002 ACS  
 RN 474317-42-5 REGISTRY  
 CN Iron lithium manganese phosphate ( $Fe0.2-0.6LiMn0.4-0.8(PO4)$ ) (9CI) (CA INDEX NAME)  
 MF Fe . Li . Mn . O4 P  
 AF Fe0.2-0.6 Li Mn0.4-0.8 O4 P  
 CI TIS  
 SR CA  
 LC STN Files: CA, CAPLUS

Component	Ratio	Component Registry Number

O4P	1	14265-44-2
Mn	0.4 - 0.8	7439-96-5
Li	1	7439-93-2
Fe	0.2 - 0.6	7439-89-6

1 REFERENCES IN FILE CA (1962 TO DATE)  
 1 REFERENCES IN FILE CAPLUS (1962 TO DATE)

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (0.01-0.99)/Zn and (1)/P and (4)/O  
 87622 (0.01-2)/LI  
 6916 (0.5-0.95)/MN  
 19436 (0.01-0.99)/ZN  
 815165 (1)/P  
 2967528 (4)/O  
 L6 0 (0.01-2)/LI AND (0.5-0.95)/MN AND (0.01-0.99)/ZN AND (1)/P AND  
 (4)/O

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (0.01-0.99)/Mg and (1)/P and (4)/O  
 87622 (0.01-2)/LI  
 6916 (0.5-0.95)/MN  
 23146 (0.01-0.99)/MG  
 815165 (1)/P  
 2967528 (4)/O  
 L7 9 (0.01-2)/LI AND (0.5-0.95)/MN AND (0.01-0.99)/MG AND (1)/P AND  
 (4)/O

=> s (0.01-2)/Li and (0.5-0.95)/Mn and (0.01-0.99)/Co and (1)/P and (4)/O  
 87622 (0.01-2)/LI  
 6916 (0.5-0.95)/MN  
 15183 (0.01-0.99)/CO  
 815165 (1)/P  
 2967528 (4)/O  
 L8 5 (0.01-2)/LI AND (0.5-0.95)/MN AND (0.01-0.99)/CO AND (1)/P AND  
 (4)/O

=> file caplus  
 COST IN U.S. DOLLARS  
 FULL ESTIMATED COST

	SINCE FILE ENTRY	TOTAL SESSION
	157.98	158.19

FILE 'CAPLUS' ENTERED AT 15:30:39 ON 16 DEC 2002  
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 COPYRIGHT (C) 2002 AMERICAN CHEMICAL SOCIETY (ACS)

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FILE COVERS 1907 - 16 Dec 2002 VOL 137 ISS 25  
 FILE LAST UPDATED: 15 Dec 2002 (20021215/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

CAS roles have been modified effective December 16, 2001. Please check your SDI profiles to see if they need to be revised. For information on CAS roles, enter HELP ROLES at an arrow prompt or use the CAS Roles thesaurus (/RL field) in this file.

=> s 13 or 17 or 18

71 L3

5 L7

3 L8

L9 71 L3 OR L7 OR L8

=> s 19 and battery

95641 BATTERY

L10 19 L9 AND BATTERY

=> d 110 ibib kwic 1-19

L10 ANSWER 1 OF 19 CAPLUS COPYRIGHT 2002 ACS

ACCESSION NUMBER: 2002:904470 CAPLUS

DOCUMENT NUMBER: 137:372594

TITLE: Lithium transition-metal phosphate powder for rechargeable batteries

PATENT ASSIGNEE(S): N.V. Umicore S.A., Belg.; Centre National de la Recherche Scientifique

SOURCE: Eur. Pat. Appl., 15 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1261050	A1	20021127	EP 2001-401374	20010523

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

WO 2002099913 A1 20021212 WO 2002-EP5714 20020522

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.: EP 2001-401374 A 20010523

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

ST battery cathode lithium transition metal phosphate powder

IT Battery cathodes

(lithium transition-metal phosphate powder for rechargeable batteries)

IT 15365-14-7P, Iron lithium phosphate FeLiPO<sub>4</sub> 475273-80-4P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(lithium transition-metal phosphate powder for rechargeable batteries)

L10 ANSWER 2 OF 19 CAPLUS COPYRIGHT 2002 ACS

ACCESSION NUMBER: 2002:849980 CAPLUS

DOCUMENT NUMBER: 137:340029

TITLE: Method of forming phosphate powder particle compositions with complex anions for electrodes and batteries

INVENTOR(S) : Chaloner-Gill, Benjamin; Pinoli, Allison A.; Horne, Craig R.; Mosso, Ronald J.; Bi, Xiangxin  
PATENT ASSIGNEE(S) : Neo Photonics Corporation, USA  
SOURCE: PCT Int. Appl., 59 pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002089233	A2	20021107	WO 2002-US12069	20020418
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
PRIORITY APPLN. INFO.:	US 2001-845985 A 20010430			
ST	battery electrode phosphate powder particle compn			
IT	Battery cathodes Coating materials IR lasers (method of forming phosphate powder particle compns. with complex anions for electrodes and batteries)			
IT	10045-86-0P, Ferric phosphate 14940-41-1P, Ferrous phosphate 15365-14-7P 474317-40-3P, Iron lithium phosphate (FeLi0.1-1(PO4)) 474317-41-4P, Iron lithium manganese phosphate (Fe0.2-1LiMn0-0.8(PO4)) 474317-42-5P, Iron lithium manganese phosphate (Fe0.2-0.6LiMn0.4-0.8(PO4)) RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses) (method of forming phosphate powder particle compns. with complex anions for electrodes and batteries)			

L10 ANSWER 3 OF 19 CAPLUS COPYRIGHT 2002 ACS  
ACCESSION NUMBER: 2002:505613 CAPLUS  
DOCUMENT NUMBER: 137:355365  
TITLE: Optimized LiMnyFe1-yPO4 as the cathode for lithium batteries  
AUTHOR(S): Li, Guohua; Azuma, Hideto; Tohda, Masayuki  
CORPORATE SOURCE: Nishi Battery Laboratories, Sony Corporation, Atsugi, 243-0021, Japan  
SOURCE: Journal of the Electrochemical Society (2002), 149(6), A743-A747  
PUBLISHER: Electrochemical Society  
DOCUMENT TYPE: Journal  
LANGUAGE: English  
REFERENCE COUNT: 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT  
ST lithium manganese iron phosphate carbon black battery cathode; rechargeable lithium battery cathode carbon lithium manganese iron phosphate  
IT Battery cathodes  
(optimized high-manganese-content carbon black-contg. lithium manganese iron phosphates as cathodes for rechargeable lithium batteries)  
IT 15365-14-7, Iron lithium phosphate (FeLiPO4) 213467-46-0, Iron lithium manganese phosphate (FeLi2Mn(PO4)2) 300858-61-1 371145-95-8

407629-83-8 407640-52-2, Iron lithium manganese phosphate  
 (Fe0.1-LiMn0.9(PO4)) 412351-36-1, Iron lithium manganese phosphate  
 (Fe0.9LiMn0.1(PO4)) 464174-83-2 464174-90-1 474902-99-3,  
 Iron lithium manganese phosphate (Fe0.35LiMn0.65(PO4)) 474903-00-9  
 , Iron lithium manganese phosphate (Fe0.3LiMn0.7(PO4)) 474903-03-2  
 , Iron lithium manganese phosphate (Fe0.1LiMn0.9(PO4)) 474903-04-3  
 RL: PRP (Properties); TEM (Technical or engineered material use); USES  
 (Uses)  
 (cathode; optimized high-manganese-content carbon black-contg. lithium  
 manganese iron phosphates as cathodes for rechargeable lithium  
 batteries)

L10 ANSWER 4 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2002:454726 CAPLUS  
 DOCUMENT NUMBER: 137:281757  
 TITLE: Olivine-type cathodes for lithium batteries  
 AUTHOR(S): Yamada, A.; Hosoya, M.; Chung, S. C.; Hinokuma, K.;  
 Kudo, Y.; Liu, K. Y.  
 CORPORATE SOURCE: Frontier Science Laboratories, Sony Corporation,  
 Yokohama, 240-0036, Japan  
 SOURCE: Ceramic Transactions (2002), 127 (Materials for  
 Electrochemical Energy Conversion and Storage),  
 189-203  
 CODEN: CETREW; ISSN: 1042-1122  
 PUBLISHER: American Ceramic Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS  
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

ST battery cathodes iron lithium manganese phosphate  
 IT Battery cathodes  
 (olivine-type cathodes for lithium batteries)  
 IT 13826-59-0 15365-14-7 300858-61-1 407629-83-8 464174-82-1,  
 Iron lithium manganese phosphate ((Fe,Mn)Li0.1(PO4)) 464174-83-2  
 464174-90-1  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
 process); PROC (Process)  
 (olivine-type cathodes for lithium batteries)

L10 ANSWER 5 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2002:368811 CAPLUS  
 DOCUMENT NUMBER: 136:357523  
 TITLE: Cathode active mass and battery using the  
 active mass  
 INVENTOR(S): Li, Guohua  
 PATENT ASSIGNEE(S): Sony Corporation, Japan  
 SOURCE: PCT Int. Appl., 28 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002039523	A1	20020516	WO 2001-JP9747	20011107
W: CA, CN, KR, MX, US				
RW: DE, FI, FR, GB, SE				
JP 2002151072	A2	20020524	JP 2000-342410	20001109
PRIORITY APPLN. INFO.:			JP 2000-342410	A 20001109

REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS  
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT  
 TI Cathode active mass and battery using the active mass  
 AB The cathode active mass contains  $Li_{1+x}Mn_yFe_zPO_4$  ( $0 < x < 0.1$ ,  $0.5 < y < 0.95$ ,

0.9 < (y+z) . ltoreq.1. The **battery** is a secondary Li **battery**.  
ST secondary **battery** cathode lithium manganese iron phosphate  
IT **Battery** cathodes  
(compns. of lithium iron manganese phosphate active mass for secondary lithium batteries)  
IT 421766-60-1, Iron lithium manganese phosphate (Fe0.05-0.5Li1-1.1Mn0.5-0.95(PO4)) 421766-61-2, Iron lithium manganese phosphate (Fe0.27Li1.03Mn0.7(PO4)) 421766-62-3, Iron lithium manganese phosphate (Fe0.25Li1.05Mn0.7(PO4)) 421766-63-4, Iron lithium manganese phosphate (Fe0.22Li1.03Mn0.75(PO4)) 421766-64-5, Iron lithium manganese phosphate (Fe0.2Li1.05Mn0.75(PO4)) 421766-65-6, Iron lithium manganese phosphate (Fe0.25Li1.03Mn0.75(PO4))  
RL: DEV (Device component use); USES (Uses)  
(compns. of lithium iron manganese phosphate active mass for secondary lithium batteries)

L10 ANSWER 6 OF 19 CAPLUS COPYRIGHT 2002 ACS  
ACCESSION NUMBER: 2002:288922 CAPLUS |  
DOCUMENT NUMBER: 137:219425  
TITLE: 7Li and 31P magic angle spinning nuclear magnetic resonance of LiFePO4-type materials  
AUTHOR(S): Tucker, Michael C.; Doeff, Marca M.; Richardson, Thomas J.; Finones, Rita; Reimer, Jeffrey A.; Cairns, Elton J.  
CORPORATE SOURCE: Energy and Environmental Technologies Division, Ernest Orlando Lawrence Berkeley National Laboratory and Department of Chemical Engineering, University of California Berkeley, Berkeley, CA, 94720, USA  
SOURCE: Electrochemical and Solid-State Letters (2002), 5 (5), A95-A98  
PUBLISHER: Electrochemical Society  
DOCUMENT TYPE: Journal  
LANGUAGE: English  
REFERENCE COUNT: 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

ST magic angle spinning NMR lithium phosphorus phosphate **battery** cathode; secondary **battery** cathode lithium iron magnesium phosphate magnetic susceptibility  
IT **Battery** cathodes  
MAS NMR spectroscopy  
Magnetic susceptibility  
Paramagnetic centers  
Solid state secondary batteries  
(Li and 31P magic angle spinning NMR of LiFePO4-type materials)  
IT 19414-36-9, Iron lithium manganese phosphate ((Fe,Mn) Li(PO4))  
RL: TEM (Technical or engineered material use); USES (Uses)  
(Li and 31P magic angle spinning NMR of LiFePO4-type materials)

L10 ANSWER 7 OF 19 CAPLUS COPYRIGHT 2002 ACS  
ACCESSION NUMBER: 2002:272915 CAPLUS  
DOCUMENT NUMBER: 136:297401  
TITLE: Nonaqueous electrolyte **battery** with high discharge\capacity  
INVENTOR(S): Sakai, Hideki; Fukushima, Yuzuru; Kuyama, Junji; Hosoya, Mamoru  
PATENT ASSIGNEE(S): Sony Corporation, Japan  
SOURCE: Eur. Pat. Appl., 17 pp.  
CODEN: EPXXDW  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1195838	A2	20020410	EP 2001-123895	20011005
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002117908	A2	20020419	JP 2000-308303	20001006
CN 1348230	A	20020508	CN 2001-130350	20010930
US 2002150816	A1	20021017	US 2001-971912	20011005
PRIORITY APPLN. INFO.: JP 2000-308303 A 20001006				
TI Nonaqueous electrolyte <b>battery</b> with high discharge capacity				
ST <b>battery</b> nonaq electrolyte high discharge capacity				
IT Secondary batteries (lithium; nonaq. electrolyte <b>battery</b> with high discharge capacity)				
IT <b>Battery</b> cathodes (nonaq. electrolyte <b>battery</b> with high discharge capacity)				
IT Carbon black, uses RL: DEV (Device component use); USES (Uses) (nonaq. electrolyte <b>battery</b> with high discharge capacity)				
IT Lithium alloy, base RL: DEV (Device component use); USES (Uses) (nonaq. electrolyte <b>battery</b> with high discharge capacity)				
IT 7439-93-2, Lithium, uses 15365-14-7, Iron lithium phosphate felipo4 407606-22-8, Chromium iron lithium phosphate (Cr0-0.8Fe0.2-1Li0.05- 1.2(PO4)) 407606-24-0, Cobalt iron lithium phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-26-2, Copper iron lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-28-4, Aluminum iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-30-8, Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-32-0, Boron iron lithium phosphate (B0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-34-2, Iron lithium manganese phosphate (Fe0.2-1Li0.05- 1.2Mn0-0.8(PO4)) 407606-36-4, Iron lithium nickel phosphate (Fe0.2-1Li0.05-1.2Ni0-0.8(PO4)) 407606-39-7, Iron lithium vanadium phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4)) 407606-42-2, Iron lithium molybdenum phosphate (Fe0.2-1Li0.05-1.2Mo0-0.8(PO4)) 407606-44-4, Iron lithium titanium phosphate (Fe0.2-1Li0.05-1.2Ti0-0.8(PO4)) 407606-47-7, Iron lithium zinc phosphate (Fe0.2-1Li0.05-1.2Zn0-0.8(PO4)) 407606-49-9, Iron lithium magnesium phosphate (Fe0.2-1Li0.05-1.2Mg0-0.8(PO4)) 407606-51-3, Iron lithium niobium phosphate (Fe0.2-1Li0.05-1.2Nb0- 0.8(PO4)) 407629-83-8 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-05-1 407630-10-8 407630-14-2 407630-25-5, Aluminum iron lithium phosphate (Al0.7Fe0.3Li(PO4)) 407630-29-9, Gallium iron lithium phosphate (Ga0.7Fe0.3Li(PO4)) 407630-35-7 407630-40-4, Boron iron lithium phosphate (B0.75Fe0.25Li(PO4)) 408501-54-2 RL: DEV (Device component use); USES (Uses) (nonaq. electrolyte <b>battery</b> with high discharge capacity)				

L10 ANSWER 8 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2002:272914 CAPLUS  
 DOCUMENT NUMBER: 136:297400  
 TITLE: Nonaqueous electrolyte secondary **battery**  
 using olivinic lithium phosphorus oxide cathode active  
 material  
 INVENTOR(S): Okawa, Tsuyoshi; Hosoya, Mamoru; Kuyama, Junji;  
 Fukushima, Yuzuru  
 PATENT ASSIGNEE(S): Sony Corporation, Japan  
 SOURCE: Eur. Pat. Appl., 15 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1195837	A2	20020410	EP 2001-123893	20011005
R: AT, BE, CH, DE, DK, ES, FR, IE, SI, LT, LV, FI, RO			GB, GR, IT, LI, LU, NL, SE, MC, PT,	
JP 2002117907	A2	20020419	JP 2000-308302	20001006
CN 1350342	A	20020522	CN 2001-139303	20010930
US 2002106563	A1	20020808	US 2001-972375	20011005
PRIORITY APPLN. INFO.:			JP 2000-308302	A 20001006
TI	Nonaqueous electrolyte secondary <b>battery</b> using olivinic lithium phosphorus oxide cathode active material			
AB	In a <b>battery</b> , liq. leakage or destruction may be prevented as the apparent energy d. per unit vol. of the cell is maintained. The cell uses, as a cathode active material, a compd. of an olivinic crystal structure having the formula $LixFel-xMyPO_4$ , where M is at least one selected from the group of Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B and Nb and 0.05 $\leq$ x $\leq$ 1.2 and 0 $\leq$ y $\leq$ 0.8. By adjusting the amt. of the electrolyte soln., the amt. of the void in the container is set so as to be not less than 0.14 mL and not more than 3.3 mL per 1 Ah of the cell capacity.			
ST	<b>battery</b> olivinic lithium phosphorus oxide cathode; nonaq electrolyte lithium secondary <b>battery</b>			
IT	Secondary batteries (lithium; nonaq. electrolyte secondary <b>battery</b> using olivinic lithium phosphorus oxide cathode active material)			
IT	<b>Battery</b> cathodes Composites (nonaq. electrolyte secondary <b>battery</b> using olivinic lithium phosphorus oxide cathode active material)			
IT	Coke RL: DEV (Device component use); USES (Uses) (pitch; nonaq. electrolyte secondary <b>battery</b> using olivinic lithium phosphorus oxide cathode active material)			
IT	108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7440-44-0, Carbon, uses 15365-14-7, Iron lithium phosphate felipo <sub>4</sub> 21324-40-3, Lithium hexafluorophosphate 407606-22-8, Chromium iron lithium phosphate (Cr <sub>0.8</sub> Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2(PO <sub>4</sub> )) 407606-24-0, Cobalt iron lithium phosphate (Co <sub>0.8</sub> Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2(PO <sub>4</sub> )) 407606-26-2, Copper iron lithium phosphate (Cu <sub>0.8</sub> Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2(PO <sub>4</sub> )) 407606-28-4, Aluminum iron lithium phosphate (Al <sub>0.8</sub> Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2(PO <sub>4</sub> )) 407606-30-8, Gallium iron lithium phosphate (Ga <sub>0.8</sub> Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2(PO <sub>4</sub> )) 407606-32-0, Boron iron lithium phosphate (B <sub>0.8</sub> Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2(PO <sub>4</sub> )) 407606-34-2, Iron lithium manganese phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2Mn <sub>0.8</sub> (PO <sub>4</sub> )) 407606-36-4, Iron lithium nickel phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2Ni <sub>0.8</sub> (PO <sub>4</sub> )) 407606-39-7, Iron lithium vanadium phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2V <sub>0.8</sub> (PO <sub>4</sub> )) 407606-42-2, Iron lithium molybdenum phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2Mo <sub>0.8</sub> (PO <sub>4</sub> )) 407606-44-4, Iron lithium titanium phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2Ti <sub>0.8</sub> (PO <sub>4</sub> )) 407606-47-7, Iron lithium zinc phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2Zn <sub>0.8</sub> (PO <sub>4</sub> )) 407606-49-9, Iron lithium magnesium phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2Mg <sub>0.8</sub> (PO <sub>4</sub> )) 407606-51-3, Iron lithium niobium phosphate (Fe <sub>0.2</sub> -1Li <sub>0.05</sub> -1.2Nb <sub>0.8</sub> (PO <sub>4</sub> )) 407629-83-8 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-05-1 407630-10-8 407630-14-2 407630-19-7 407630-25-5, Aluminum iron lithium phosphate (Al <sub>0.7</sub> Fe <sub>0.3</sub> Li(PO <sub>4</sub> )) 407630-29-9, Gallium iron lithium phosphate (Ga <sub>0.7</sub> Fe <sub>0.3</sub> Li(PO <sub>4</sub> )) 407630-35-7 407630-40-4, Boron iron lithium phosphate (B <sub>0.75</sub> Fe <sub>0.25</sub> Li(PO <sub>4</sub> )) 407630-46-0 RL: DEV (Device component use); USES (Uses) (nonaq. electrolyte secondary <b>battery</b> using olivinic lithium phosphorus oxide cathode active material)			

DOCUMENT NUMBER: 136:297398  
 TITLE: Cathode and anode materials for solid nonaqueous electrolyte **battery**  
 INVENTOR(S): Takahashi, Kimio; Hosoya, Mamoru; Miyake, Masami  
 PATENT ASSIGNEE(S): Sony Corporation, Japan  
 SOURCE: Eur. Pat. Appl., 22 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1195835	A2	20020410	EP 2001-123773	20011004
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002117902	A2	20020419	JP 2000-306877	20001005
CN 1348231	A	20020508	CN 2001-138524	20010930

PRIORITY APPLN. INFO.: JP 2000-306877 A 20001005

TI Cathode and anode materials for solid nonaqueous electrolyte **battery**

AB A **battery** is not deteriorated in cell characteristics and maintains the cell shape encapsulated in a laminate film even when overdischarged to a cell voltage of 0 V. The cell includes a cathode contg. a compd. having the formula  $LixFe1-yMyPO4$ , where M is at least one selected from the group consisting of Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B and Nb, with  $0.05 \leq x \leq 1.2$  and  $0 \leq y \leq 0.8$ , an anode and a solid electrolyte. A cell member comprised of the cathode and the anode, layered together with the interposition of a solid electrolyte, is encapsulated in a laminate film.

ST **battery** solid nonaq electrolyte cathode anode material

IT Battery anodes

Battery cathodes

Battery electrolytes

(cathode and anode materials for solid nonaq. electrolyte **battery**)

IT 7440-44-0, Carbon, uses 15365-14-7, Iron lithium phosphate  $FePO_4$   
 407606-22-8, Chromium iron lithium phosphate  $(CrO_0.8FeO_0.2-LiO_0.05-1.2(PO_4))$   
 407606-24-0, Cobalt iron lithium phosphate  $(CoO_0.8FeO_0.2-LiO_0.05-1.2(PO_4))$   
 407606-26-2, Copper iron lithium phosphate  $(CuO_0.8FeO_0.2-LiO_0.05-1.2(PO_4))$   
 407606-28-4, Aluminum iron lithium phosphate  $(AlO_0.8FeO_0.2-LiO_0.05-1.2(PO_4))$   
 407606-30-8, Gallium iron lithium phosphate  $(GaO_0.8FeO_0.2-LiO_0.05-1.2(PO_4))$   
 407606-32-0, Boron iron lithium phosphate  $(BO_0.8FeO_0.2-LiO_0.05-1.2(PO_4))$   
 407606-34-2, Iron lithium manganese phosphate  $(FeO_0.2-LiO_0.05-1.2MnO_0-0.8(PO_4))$   
 407606-36-4, Iron lithium nickel phosphate  $(FeO_0.2-LiO_0.05-1.2NiO_0-0.8(PO_4))$   
 407606-39-7, Iron lithium vanadium phosphate  $(FeO_0.2-LiO_0.05-1.2V_2O_0-0.8(PO_4))$   
 407606-42-2, Iron lithium molybdenum phosphate  $(FeO_0.2-LiO_0.05-1.2MoO_0-0.8(PO_4))$   
 407606-44-4, Iron lithium titanium phosphate  $(FeO_0.2-LiO_0.05-1.2TiO_0-0.8(PO_4))$   
 407606-47-7, Iron lithium zinc phosphate  $(FeO_0.2-LiO_0.05-1.2ZnO_0-0.8(PO_4))$   
 407606-49-9, Iron lithium magnesium phosphate  $(FeO_0.2-LiO_0.05-1.2MgO_0-0.8(PO_4))$   
 407606-51-3, Iron lithium niobium phosphate  $(FeO_0.2-LiO_0.05-1.2NbO_0-0.8(PO_4))$

RL: DEV (Device component use); USES (Uses)

(cathode and anode materials for solid nonaq. electrolyte **battery**)

IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)

(cathode and anode materials for solid nonaq. electrolyte **battery**)

L10 ANSWER 10 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2002:272909 CAPLUS  
 DOCUMENT NUMBER: 136:297395  
 TITLE: Method for fabrication of cathode active material and  
 a nonaqueous electrolyte **battery**  
 INVENTOR(S): Hosoya, Mamoru; Fukushima, Yuzuru; Sakai, Hideki;  
 Kuyama, Junji  
 PATENT ASSIGNEE(S): Sony Corporation, Japan  
 SOURCE: Eur. Pat. Appl., 31 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1195827	A2	20020410	EP 2001-123894	20011005
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002117848	A2	20020419	JP 2000-308300	20001006
JP 2002117849	A2	20020419	JP 2000-308313	20001006
US 2002124386	A1	20020912	US 2001-966918	20010928
CN 1360353	A	20020724	CN 2001-138169	20010930
PRIORITY APPLN. INFO.:			JP 2000-308300	A 20001006
			JP 2000-308313	A 20001006

TI Method for fabrication of cathode active material and a nonaqueous  
electrolyte **battery**

ST cathode active material nonaq electrolyte **battery**

IT Ball milling

**Battery** cathodes

    Composites

    Secondary batteries

        (method for fabrication of cathode active material and nonaq.  
        electrolyte **battery**)

IT Carbon black, uses

    RL: DEV (Device component use); MOA (Modifier or additive use); USES  
(Uses)

        (method for fabrication of cathode active material and nonaq.  
        electrolyte **battery**)

IT 7440-44-0, Carbon, uses 198782-39-7, Iron lithium phosphate  
(FeLi0-1(PO4)) 407606-22-8, Chromium iron lithium phosphate  
(Cr0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-24-0, Cobalt iron lithium  
phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-26-2, Copper iron  
lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-28-4, Aluminum  
iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-30-8,  
Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-1.2(PO4))  
407606-32-0, Boron iron lithium phosphate (B0-0.8Fe0.2-1Li0.05-1.2(PO4))  
407606-34-2, Iron lithium manganese phosphate (Fe0.2-1Li0.05-  
1.2Mn0-0.8(PO4)) 407606-36-4, Iron lithium nickel phosphate  
(Fe0.2-1Li0.05-1.2Ni0-0.8(PO4)) 407606-39-7, Iron lithium vanadium  
phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4)) 407606-42-2, Iron lithium  
molybdenum phosphate (Fe0.2-1Li0.05-1.2Mo0-0.8(PO4)) 407606-44-4, Iron  
lithium titanium phosphate (Fe0.2-1Li0.05-1.2Ti0-0.8(PO4)) 407606-47-7,  
Iron lithium zinc phosphate (Fe0.2-1Li0.05-1.2Zn0-0.8(PO4)) 407606-49-9,  
Iron lithium magnesium phosphate (Fe0.2-1Li0.05-1.2Mg0-0.8(PO4))  
407606-51-3, Iron lithium niobium phosphate (Fe0.2-1Li0.05-1.2Nb0-  
0.8(PO4)) 407629-87-2 407629-90-7 407629-95-2 407630-01-7  
407630-10-8 407630-14-2

    RL: DEV (Device component use); USES (Uses)  
        (method for fabrication of cathode active material and nonaq.  
        electrolyte **battery**)

IT 15365-14-7P, Iron lithium phosphate FeLiPO4

    RL: DEV (Device component use); SPN (Synthetic preparation); PREP

(Preparation); USES (Uses)

(method for fabrication of cathode active material and nonaq.  
electrolyte **battery**)

IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer  
RL: MOA (Modifier or additive use); USES (Uses)  
(method for fabrication of cathode active material and nonaq.  
electrolyte **battery**)

L10 ANSWER 11 OF 19 CAPLUS COPYRIGHT 2002 ACS

ACCESSION NUMBER: 2002:272908 CAPLUS

DOCUMENT NUMBER: 136:297394

TITLE: Solid electrolyte cell

INVENTOR(S): Goto, Shuji; Hosoya, Mamoru; Endo, Takahiro

PATENT ASSIGNEE(S): Sony Corporation, Japan

SOURCE: Eur. Pat. Appl., 16 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1195826	A2	20020410	EP 2001-123774	20011004
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002117844	A2	20020419	JP 2000-306876	20001005
US 2002094481	A1	20020718	US 2001-966864	20010928
CN 1349273	A	20020515	CN 2001-139323	20010930
PRIORITY APPLN. INFO.:			JP 2000-306876	A 20001005

ST **battery** solid electrolyte

IT **Battery** cathodes

Secondary batteries

(solid electrolyte cell)

IT 7439-93-2D, Lithium, polyethylene oxide complex 7791-03-9, Lithium perchlorate 12031-65-1, Lithium nickel oxide  $\text{LiNiO}_2$  12057-17-9, Lithium manganese oxide  $\text{LiMn}_2\text{O}_4$  15365-14-7, Iron lithium phosphate  $\text{FeLiPO}_4$  25322-68-3D, Polyethylene oxide, lithium complex 116327-69-6, Cobalt lithium nickel oxide  $\text{CoO} \cdot 1\text{LiNiO}_0.902$  147812-18-8, Iron lithium manganese oxide  $\text{FeO} \cdot 0.05\text{LiMn}_1.95\text{O}_4$  407606-22-8, Chromium iron lithium phosphate ( $\text{CrO}_0 \cdot 0.8\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2(\text{PO}_4)$ ) 407606-24-0, Cobalt iron lithium phosphate ( $\text{CoO} \cdot 0.8\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2(\text{PO}_4)$ ) 407606-26-2, Copper iron lithium phosphate ( $\text{CuO} \cdot 0.8\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2(\text{PO}_4)$ ) 407606-28-4, Aluminum iron lithium phosphate ( $\text{AlO} \cdot 0.8\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2(\text{PO}_4)$ ) 407606-30-8, Gallium iron lithium phosphate ( $\text{GaO} \cdot 0.8\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2(\text{PO}_4)$ ) 407606-32-0, Boron iron lithium phosphate ( $\text{BO} \cdot 0.8\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2(\text{PO}_4)$ ) 407606-34-2, Iron lithium manganese phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{MnO}_0 \cdot 0.8(\text{PO}_4)$ ) 407606-36-4, Iron lithium nickel phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{NiO}_0 \cdot 0.8(\text{PO}_4)$ ) 407606-39-7, Iron lithium vanadium phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{V}_2\text{O}_5 \cdot 0.8(\text{PO}_4)$ ) 407606-42-2, Iron lithium molybdenum phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{MoO}_0 \cdot 0.8(\text{PO}_4)$ ) 407606-44-4, Iron lithium titanium phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{TiO}_0 \cdot 0.8(\text{PO}_4)$ ) 407606-47-7, Iron lithium zinc phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{ZnO}_0 \cdot 0.8(\text{PO}_4)$ ) 407606-49-9, Iron lithium magnesium phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{MgO}_0 \cdot 0.8(\text{PO}_4)$ ) 407606-51-3, Iron lithium niobium phosphate ( $\text{FeO}_0.2 \cdot 1\text{LiO}_0.05 \cdot 1.2\text{NbO}_0 \cdot 0.8(\text{PO}_4)$ ) 408331-94-2, Cobalt lithium nickel oxide ( $(\text{Co}, \text{Ni})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408331-95-3, Cobalt lithium manganese oxide ( $(\text{Co}, \text{Mn})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408331-96-4, Cobalt lithium zinc oxide ( $(\text{Co}, \text{Zn})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408331-97-5, Cobalt lithium tin oxide ( $(\text{Co}, \text{Sn})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408331-99-7, Cobalt lithium vanadium oxide ( $(\text{Co}, \text{V})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408332-00-3, Cobalt lithium titanium oxide ( $(\text{Co}, \text{Ti})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408332-01-4, Cobalt lithium molybdenum oxide ( $(\text{Co}, \text{Mo})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408332-02-5, Cobalt lithium tungsten oxide ( $(\text{Co}, \text{W})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408332-03-6, Cobalt lithium magnesium oxide ( $(\text{Co}, \text{Mg})\text{LiO}_0 \cdot 2\text{O}_2$ ) 408332-04-7, Cobalt lithium strontium oxide

((Co,Sr)Li0-202) 408332-05-8, Cobalt lithium niobium oxide  
 ((Co,Nb)Li0-202) 408332-06-9, Cobalt iron lithium oxide ((Co,Fe)Li0-202)  
 408332-07-0, Cobalt copper lithium oxide ((Co,Cu)Li0-202) 408332-08-1,  
 Aluminum cobalt lithium oxide ((Al,Co)Li0-202) 408332-09-2, Cobalt  
 lithium borate oxide (Co0-1Li0-2(BO2)0-100-2) 408332-10-5, Cobalt  
 gallium lithium oxide ((Co,Ga)Li0-202) 408332-11-6, Chromium cobalt  
 lithium oxide ((Cr,Co)Li0-202) 408332-12-7, Calcium cobalt lithium oxide  
 ((Ca,Co)Li0-202) 408332-13-8, Iron lithium nickel oxide ((Fe,Ni)Li0-202)  
 408332-14-9, Copper lithium nickel oxide ((Cu,Ni)Li0-202) 408332-15-0,  
 Aluminum lithium nickel oxide ((Al,Ni)Li0-202) 408332-16-1, Lithium  
 nickel borate oxide (Li0-2Ni0-1(BO2)0-100-2) 408332-17-2, Gallium  
 lithium nickel oxide ((Ga,Ni)Li0-202) 408332-18-3, Chromium lithium  
 nickel oxide ((Cr,Ni)Li0-202) 408332-19-4, Calcium lithium nickel oxide  
 ((Ca,Ni)Li0-202) 408332-20-7, Lithium manganese nickel oxide  
 (Li0-2(Mn,Ni)O2) 408332-21-8, Lithium nickel zinc oxide (Li0-2(Ni,Zn)O2)  
 408332-22-9, Lithium nickel tin oxide (Li0-2(Ni,Sn)O2) 408332-23-0,  
 Lithium nickel vanadium oxide (Li0-2(Ni,V)O2) 408332-24-1, Lithium  
 nickel titanium oxide (Li0-2(Ni,Ti)O2) 408332-25-2, Lithium nickel  
 tungsten oxide (Li0-2(Ni,W)O2) 408332-26-3, Lithium molybdenum nickel  
 oxide (Li0-2(Mo,Ni)O2) 408332-27-4, Lithium magnesium nickel oxide  
 (Li0-2(Mg,Ni)O2) 408332-28-5, Lithium nickel strontium oxide  
 (Li0-2(Ni,Sr)O2) 408332-29-6, Lithium nickel niobium oxide  
 (Li0-2(Ni,Nb)O2) 408332-30-9, Lithium manganese nickel oxide  
 (Li0-2(Mn,Ni)204) 408332-31-0, Lithium manganese zinc oxide  
 (Li0-2(Mn,Zn)204) 408332-32-1, Lithium manganese tin oxide  
 (Li0-2(Mn,Sn)204) 408332-33-2, Lithium manganese vanadium oxide  
 (Li0-2(Mn,V)204) 408332-34-3, Lithium manganese titanium oxide  
 (Li0-2(Mn,Ti)204) 408332-35-4, Lithium manganese molybdenum oxide  
 (Li0-2(Mn,Mo)204) 408332-36-5, Lithium manganese tungsten oxide  
 (Li0-2(Mn,W)204) 408332-37-6, Lithium magnesium manganese oxide  
 (Li0-2(Mg,Mn)204) 408332-38-7, Lithium manganese strontium oxide  
 (Li0-2(Mn,Sr)204) 408332-39-8, Lithium manganese niobium oxide  
 (Li0-2(Mn,Nb)204) 408332-40-1, Iron lithium manganese oxide  
 ((Fe,Mn)2Li0-204) 408332-42-3, Cobalt lithium manganese oxide  
 ((Co,Mn)2Li0-204) 408332-44-5, Aluminum lithium manganese oxide  
 ((Al,Mn)2Li0-204) 408332-45-6, Lithium manganese borate oxide  
 (Li0-2Mn0-2(BO2)0-200-4) 408332-46-7, Gallium lithium manganese oxide  
 ((Ga,Mn)2Li0-204) 408332-47-8, Chromium lithium manganese oxide  
 ((Cr,Mn)2Li0-204) 408332-48-9, Calcium lithium manganese oxide  
 ((Ca,Mn)2Li0-204) 408332-58-1, Aluminum cobalt lithium nickel oxide  
 (Al0.01Co0.98LiNi0.01O2) 412351-36-1, Iron lithium manganese phosphate  
 (Fe0.9LiMn0.1(PO4))

RL: DEV (Device component use); USES (Uses)  
 (solid electrolyte cell)

L10 ANSWER 12 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2002:256645 CAPLUS  
 DOCUMENT NUMBER: 136:297382  
 TITLE: Carbon-coated or carbon-crosslinked redox materials  
 with transition metal-lithium oxide core for use as  
**battery** electrodes  
 INVENTOR(S): Armand, Michel; Gauthier, Michel; Magnan,  
 Jean-Francois; Ravet, Nathalie  
 PATENT ASSIGNEE(S): Hydro-Quebec, Can.  
 SOURCE: PCT Int. Appl., 78 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: French  
 FAMILY ACC. NUM. COUNT: 2  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002027824	A1	20020404	WO 2001-CA1350	20010921

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

AU 2001093569 A5 20020408

AU 2001-93569 20010921

PRIORITY APPLN. INFO.:

CA 2000-2320661 A 20000926

WO 2001-CA1350 W 20010921

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

TI Carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes

AB Carbon-coated redox materials suitable for use in **battery** electrodes consist of a core surrounded by a coating, or interconnected by carbon crosslinks, in which the core includes a compn. of formula  $LixM1-yM'y(XO4)n$ , in which  $y = 0-0.6$ ,  $x = 0-2$ ,  $n = 0-1.5$ ; M is a transition metal; and M' is an element of fixed valence selected from  $Mg^{2+}$ ,  $Ca^{2+}$ ,  $Al^{3+}$ , and  $Zn^{2+}$ , and X is S, P, and Si. Synthesis of the materials is carried out by reacting a balanced mixt. of appropriate precursors in a reducing atm., to adjust the valence of the transition metals, in the presence of a carbon source, which is then pyrolyzed. The resulting products exhibit an excellent elec. cond. and a highly enhanced chem. activity.

ST carbon encapsulated redox material **battery** electrode; cathode  
**battery** carbon coated redox material

IT Silanes

RL: RCT (Reactant); RACT (Reactant or reagent)  
(alkoxy, silicon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT Polyoxyalkylenes, uses

RL: NUU (Other use, unclassified); USES (Uses)  
(alkyl ethers, oligomeric, aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT Fluoropolymers, uses

Polyesters, uses

Polyethers, uses

RL: NUU (Other use, unclassified); USES (Uses)  
(binders; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT **Battery** cathodes

**Battery** electrodes

Redox agents  
(carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT Transition metals, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(electrodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 78-93-3, Methyl ethyl ketone, uses 96-48-0, Butyrolactone 96-49-1, Ethylene carbonate 107-21-1D, Ethylene glycol, alkyl ethers 108-32-7, Propylene carbonate 111-46-6D, Diethylene glycol, alkyl ethers 112-27-6D, Triethylene glycol, alkyl ethers 112-60-7D, Tetraethylene glycol, alkyl ethers 463-79-6D, Carbonic acid, C1-4-alkyl esters

RL: NUU (Other use, unclassified); USES (Uses)  
(aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery**

electrodes)

IT 9011-14-7, Poly(methyl methacrylate) 24937-79-9, Poly(vinylidene difluoride) 25014-41-9, Polyacrylonitrile  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (binders; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 50-99-7, Glucose, reactions 57-48-7, Fructose, reactions 57-50-1, Sucrose, reactions 58-86-6, Xylose, reactions 87-79-6, Sorbose 9002-88-4, Polyethylene 9003-07-0, Polypropylene 9004-34-6, Cellulose, reactions 9004-34-6D, Cellulose, esters 9004-35-7, Cellulose acetate 9005-25-8, Starch, reactions 25212-86-6, Poly(furfuryl alcohol) 43094-71-9, Ethylene-ethylene oxide copolymer  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (carbon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 407640-63-5, Iron lithium titanium phosphate sulfate (Fe0.85Li1.35Ti0.15(PO4)0.5(SO4))  
 RL: DEV (Device component use); USES (Uses)  
 (electrodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 7439-89-6D, Iron, mixed oxides 7439-96-5D, Manganese, mixed oxides 7440-02-0D, Nickel, mixed oxides 7440-32-6D, Titanium, mixed oxides 7440-47-3D, Chromium, mixed oxides 7440-48-4D, Cobalt, mixed oxides 7440-50-8D, Copper, mixed oxides 7440-62-2D, Vanadium, mixed oxides 13816-45-0, Triphylite 15365-14-7, Iron lithium phosphate (FeLiPO4) 213467-46-0, Iron lithium manganese phosphate (FeLi2Mn(PO4)2)  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (electrodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 90076-65-6  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (electrolyte contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 516-03-0, Ferrous oxalate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (iron source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 7429-90-5, Aluminum, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-66-6, Zinc, uses 7782-42-5, Graphite, uses 39302-37-9, Lithium titanate 207803-50-7, Aluminum cobalt lithium magnesium nickel oxide 258511-24-9, Iron lithium nitride 263898-18-6, Cobalt manganese nitride 407640-62-4  
 RL: DEV (Device component use); USES (Uses)  
 (lithium-based cathodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 638-38-0, Manganese(II) acetate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manganese source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 546-89-4, Lithium acetate 553-91-3, Lithium oxalate 554-13-2, Lithium carbonate 1309-37-1, Ferric oxide, reactions 1310-65-2, Lithium hydroxide 1313-13-9, Manganese dioxide, reactions 1314-62-1, Vanadium pentoxide, reactions 1317-61-9, Magnetite, reactions 10045-86-0, Ferric phosphate 10102-24-6, Lithium silicate (Li2SiO3) 10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate (Li3PO4) 10421-48-4, Ferric nitrate 12057-24-8, Lithium oxide, reactions 12627-14-4

13453-80-0, Lithium dihydrogen phosphate 63985-45-5, Lithium orthosilicate 407640-52-2, Iron lithium manganese phosphate (Fe0.1-1LiMn0-0.9(PO<sub>4</sub>)) 407640-53-3, Iron lithium magnesium phosphate (Fe0.7-1LiMg0-0.3(PO<sub>4</sub>)) 407640-54-4, Calcium iron lithium phosphate (Ca0-0.3Fe0.7-1Li(PO<sub>4</sub>)) 407640-55-5 407640-56-6, Iron lithium phosphate silicate (FeLi1-1.9(PO<sub>4</sub>)0.1-1(SiO<sub>4</sub>)0-0.9) 407640-57-7 407640-58-8, Iron lithium manganese phosphate sulfate (Fe0-1Li1-1.2Mn0-0.2[(PO<sub>4</sub>),(SO<sub>4</sub>)]) 407640-59-9, Iron lithium manganese phosphate ((Fe,Mn)Li1-1.6(PO<sub>4</sub>)) 407640-60-2, Iron lithium manganese phosphate sulfate (Fe1-2Li1-2Mn0-1[(PO<sub>4</sub>),(SO<sub>4</sub>)]) 407640-61-3, Iron lithium titanium phosphate ((Fe,Ti)Li0.5-2(PO<sub>4</sub>)1.5)  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (metal source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 25322-68-3D, Polyethylene glycol, alkyl ethers  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (oligomeric, aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 7664-38-2, Phosphoric acid, reactions 7664-38-2D, Phosphoric acid, esters 7783-28-0, Ammonium hydrogen phosphate 10124-54-6, Manganese phosphate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (phosphorus source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 7631-86-9, Silica, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (silicon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

IT 7664-93-9, Sulfuric acid, reactions 7783-20-2, Ammonium sulfate, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (sulfur source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery** electrodes)

L10 ANSWER 13 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2001:796403 CAPLUS  
 DOCUMENT NUMBER: 135:346864  
 TITLE: Cathode for nonaqueous electrolyte lithium ion **battery**  
 INVENTOR(S): Yamada, Atsuo; Yamahira, Takayuki  
 PATENT ASSIGNEE(S): Sony Corporation, Japan  
 SOURCE: Eur. Pat. Appl., 26 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1150368	A2	20011031	EP 2001-109919	20010424
R: AT, BE, CH, DE, DK, ES, FR, IE, SI, LT, LV, RO			GB, GR, IT, LI, LU, NL, SE, MC, PT,	
JP 2001307730	A2	20011102	JP 2000-128998	20000425
CA 2344981	AA	20011025	CA 2001-2344981	20010425
CN 1320976	A	20011107	CN 2001-117211	20010425
US 2002004169	A1	20020110	US 2001-842485	20010425

PRIORITY APPLN. INFO.: JP 2000-128998 A 20000425  
 TI Cathode for nonaqueous electrolyte lithium ion **battery**

IT Charcoal  
RL: DEV (Device component use); USES (Uses)  
(activated; cathode for nonaq. electrolyte lithium ion **battery**)  
IT **Battery** cathodes  
(cathode for nonaq. electrolyte lithium ion **battery**)  
IT Carbon fibers, uses  
Carbonaceous materials (technological products)  
Coke  
Petroleum coke  
RL: DEV (Device component use); USES (Uses)  
(cathode for nonaq. electrolyte lithium ion **battery**)  
IT Carbon black, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(cathode for nonaq. electrolyte lithium ion **battery**)  
IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(cathode for nonaq. electrolyte lithium ion **battery**)  
IT Organic compounds, uses  
RL: DEV (Device component use); USES (Uses)  
(high mol., sintered; cathode for nonaq. electrolyte lithium ion  
**battery**)  
IT Secondary batteries  
(lithium; cathode for nonaq. electrolyte lithium ion **battery**)  
IT Coke  
RL: DEV (Device component use); USES (Uses)  
(needle; cathode for nonaq. electrolyte lithium ion **battery**)  
IT Coke  
RL: DEV (Device component use); USES (Uses)  
(pitch; cathode for nonaq. electrolyte lithium ion **battery**)  
IT Furan resins  
Phenolic resins, uses  
RL: DEV (Device component use); USES (Uses)  
(sintered and carbonized; cathode for nonaq. electrolyte lithium ion  
**battery**)  
IT 50-21-5D, Lactic acid, ester 60-29-7, Diethyl ether, uses 64-19-7D,  
Acetic acid, ester, uses 75-05-8, Acetonitrile, uses 79-09-4D,  
Propionic acid, ester 96-47-9, 2-Methyltetrahydrofuran 96-48-0  
96-49-1, Ethylene carbonate 100-66-3, Anisole, uses 105-58-8, Diethyl  
carbonate 107-12-0, Propionitrile 108-32-7, Propylene carbonate  
109-99-9, Thf, uses 110-71-4, 1,2-Dimethoxyethane 126-33-0, Sulfolane  
409-21-2, Silicon carbide sic, uses 554-12-1, Methyl propionate  
616-38-6, Dimethyl carbonate 623-42-7, Methyl butyrate 623-96-1,  
Dipropyl carbonate 629-14-1, 1,2-Diethoxyethane 646-06-0,  
1,3-Dioxolane 872-36-6, Vinylene carbonate 1072-47-5,  
4-Methyl-1,3-dioxolane 1313-08-2 2550-62-1, Lithium methanesulfonate  
4437-85-8, Butylene carbonate 7439-93-2, Lithium, uses 7440-50-8,  
Copper, uses 7447-41-8, Lithium chloride, uses 7550-35-8, Lithium  
bromide 7782-42-5, Graphite, uses 7791-03-9, Lithium perchlorate  
9003-07-0, Polypropylene 12007-81-7, Silicon tetraboride 12008-29-6,  
Silicon hexaboride 12013-56-8, Calcium disilicide 12017-12-8, Cobalt  
disilicide 12018-09-6, Chromium disilicide 12022-99-0, Iron disilicide  
12032-86-9, Manganese disilicide 12033-76-0, Silicon nitride oxide  
Si<sub>2</sub>N<sub>2</sub>O 12033-89-5, Silicon nitride, uses 12034-80-9, Niobium  
disilicide 12039-79-1, Tantalum disilicide 12039-83-7, Titanium  
silicide TiSi<sub>2</sub> 12039-87-1, Vanadium disilicide 12039-88-2, Tungsten  
disilicide 12059-14-2, Nickel silicide (Ni<sub>2</sub>Si) 12136-78-6, Molybdenum  
disilicide 12159-07-8, Copper silicide cu<sub>5</sub>si 12190-79-3, Cobalt  
lithium oxide colio<sub>2</sub> 12201-89-7, Nickel disilicide 14283-07-9, Lithium  
tetrafluoroborate 14485-20-2, Lithium tetraphenylborate 15365-14-7,  
Iron lithium phosphate FeLiPO<sub>4</sub> 19414-36-9, Iron lithium  
manganese phosphate ((Fe,Mn)Li(PO<sub>4</sub>)) 21324-40-3, Lithium  
hexafluorophosphate 22831-39-6, Magnesium silicide (Mg<sub>2</sub>Si) 29935-35-1,  
Lithium hexafluoroarsenate 33454-82-9, Lithium trifluoromethanesulfonate

35678-71-8, Methylsulfolane 90076-65-6 113066-89-0, Cobalt lithium  
 nickel oxide Co0.2LiNi0.8O2 113671-38-8, Silicon oxide Si00-2  
 160479-36-7, Lithium tin oxide 178958-56-0, Lithium silicon oxide  
 300858-61-1 339333-78-7, Zinc silicide ZnSi2 371148-86-6, Tin oxide  
 (SnO0-2) 371148-87-7, Lithium magnesium manganese oxide (LiMg0.2Mn0.8O2)  
 RL: DEV (Device component use); USES (Uses)  
 (cathode for nonaq. electrolyte lithium ion **battery**)  
 IT 24937-79-9, Pvdf  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathode for nonaq. electrolyte lithium ion **battery**)  
 IT 7440-44-0, Carbon, uses  
 RL: DEV (Device component use); USES (Uses)  
 (pyrocarbon; cathode for nonaq. electrolyte lithium ion **battery**)  
 )

L10 ANSWER 14 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2001:796402 CAPLUS  
 DOCUMENT NUMBER: 135:346863  
 TITLE: Cathode active material for nonaqueous electrolyte  
**battery**  
 INVENTOR(S): Li, Guohua; Yamada, Atsuo  
 PATENT ASSIGNEE(S): Sony Corporation, Japan  
 SOURCE: Eur. Pat. Appl., 47 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1150367	A2	20011031	EP 2001-109945	20010424
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2001307731	A2	20011102	JP 2000-128999	20000425
JP 2001307732	A2	20011102	JP 2000-129000	20000425
CA 2344903	AA	20011025	CA 2001-2344903	20010423
CN 1322023	A	20011114	CN 2001-121243	20010425
US 2001055718	A1	20011227	US 2001-842483	20010425
PRIORITY APPLN. INFO.:			JP 2000-128999	A 20000425
			JP 2000-129000	A 20000425

TI Cathode active material for nonaqueous electrolyte **battery**  
 ST cathode active material nonaq electrolyte **battery**  
 IT **Battery** cathodes  
 (cathode active material for nonaq. electrolyte **battery**)  
 IT Carbon black, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (cathode active material for nonaq. electrolyte **battery**)  
 IT Fluoropolymers, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathode active material for nonaq. electrolyte **battery**)  
 IT Secondary batteries  
 (lithium; cathode active material for nonaq. electrolyte  
**battery**)  
 IT 108-32-7, Propylene carbonate 616-38-6, Dimethylcarbonate 7429-90-5,  
 Aluminum, uses 21324-40-3, Lithium hexafluorophosphate  
 371145-93-6, Iron lithium manganese phosphate (Fe0.05-0.5Li0-  
 2Mn0.5-0.95(PO4))  
 RL: DEV (Device component use); USES (Uses)  
 (cathode active material for nonaq. electrolyte **battery**)  
 IT 207462-44-0P 300858-61-1P 371145-94-7P 371145-95-8P  
 371145-97-0P 371145-99-2P 371146-01-9P 371146-06-4P  
 371146-11-1P  
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP

(Preparation); USES (Uses)  
 (cathode active material for nonaq. electrolyte **battery**)

IT 24937-79-9, Pvdf  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathode active material for nonaq. electrolyte **battery**)

L10 ANSWER 15 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 2001:710111 CAPLUS  
 DOCUMENT NUMBER: 135:275341  
 TITLE: New lithium insertion electrode materials based on orthosilicate derivatives, electrochemical generators, and variable optical transmission devices having electrodes containing these materials  
 INVENTOR(S): Armand, Michel; Michot, Christophe; Ravet, Nathalie; Simoneau, Martin; Hovington, Pierre  
 PATENT ASSIGNEE(S): Hydro-Quebec, Can.; Centre National de la Recherche Scientifique (CNRS); Universite de Montreal  
 SOURCE: Jpn. Kokai Tokkyo Koho, 22 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001266882	A2	20010928	JP 2000-117248	20000314

ST lithium **battery** cathode manganese iron orthosilicate; transition metal silicate cathode lithium **battery**; optical transmission device electrode transition metal silicate; supercapacitor electrode metal orthosilicate

IT **Battery** cathodes  
 (Li-intercalatable transition metal orthosilicates as Li **battery** cathodes or variable optical transmission device electrodes)

IT Optical transmission  
 (devices; Li-intercalatable transition metal orthosilicates as Li **battery** cathodes or variable optical transmission device electrodes)

IT Primary batteries  
 Secondary batteries  
 (lithium; Li-intercalatable transition metal orthosilicates as Li **battery** cathodes or variable optical transmission device electrodes)

IT Capacitors  
 (super; Li-intercalatable transition metal orthosilicates as Li **battery** cathodes or variable optical transmission device electrodes or supercapacitor electrodes)

IT 363141-29-1P  
 RL: DEV (Device component use); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)  
 (cathodes; Li-intercalatable transition metal orthosilicates (contg. Li) used as Li **battery** cathodes or variable optical transmission device electrodes)

IT 363141-31-5  
 RL: DEV (Device component use); USES (Uses)  
 (cathodes; Li-intercalatable transition metal orthosilicates as Li **battery** cathodes or variable optical transmission device electrodes)

IT 30734-07-7P, Iron lithium silicate (FeLi<sub>2</sub>SiO<sub>4</sub>) 30734-08-8P, Lithium manganese silicate (Li<sub>2</sub>MnSiO<sub>4</sub>) 60218-97-5P, Manganese silicate (MnSiO<sub>4</sub>) 277742-94-6P, Iron lithium manganese oxide (Fe<sub>1.2</sub>Li<sub>1.4</sub>Mn<sub>0.104</sub>) 277742-95-7P, Lithium manganese titanium silicate (Li<sub>1.9</sub>Mn<sub>0.8</sub>Ti<sub>0.1</sub>(SiO<sub>4</sub>)) 277742-97-9P 363141-30-4P, Iron lithium manganese silicate

(Fe1.2Li0.1Mn0.1(SiO4))

RL: DEV (Device component use); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)  
(cathodes; Li-intercalatable transition metal orthosilicates as Li battery cathodes or variable optical transmission device electrodes)

L10 ANSWER 16 OF 19 CAPLUS COPYRIGHT 2002 ACS

ACCESSION NUMBER: 2000:688509 CAPLUS

DOCUMENT NUMBER: 133:255027

TITLE: Rechargeable lithium **battery** with lithium-containing phosphate active materials

INVENTOR(S): Barker, Jeremy

PATENT ASSIGNEE(S): Valence Technology, Inc., USA

SOURCE: PCT Int. Appl., 47 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000057505	A1	20000928	WO 2000-US4401	20000222
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6153333	A	20001128	US 1999-274371	19990323
EP 1173897	A1	20020123	EP 2000-921341	20000222
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002540569	T2	20021126	JP 2000-607293	20000222
PRIORITY APPLN. INFO.:			US 1999-274371	A1 19990323
			WO 2000-US4401	W 20000222

REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

TI Rechargeable lithium **battery** with lithium-containing phosphate active materials

AB The invention provides novel lithium-contg. phosphate materials having a high proportion of lithium per formula unit of the material. Upon electrochem. interaction, such material deintercalates lithium ions, and is capable of reversibly cycling lithium ions. The invention provides a rechargeable lithium **battery** which comprises an electrode formed from the novel lithium-contg. phosphates.

ST **battery** lithium contg phosphate electrode active material

IT Secondary batteries

(lithium; rechargeable lithium **battery** with lithium-contg. phosphate active materials)

IT **Battery** cathodes

(rechargeable lithium **battery** with lithium-contg. phosphate active materials)

IT 294664-30-5 294664-39-4 294664-56-5 294664-57-6 294664-59-8  
294664-70-3 294664-72-5

RL: DEV (Device component use); USES (Uses)

(rechargeable lithium **battery** with lithium-contg. phosphate active materials)

L10 ANSWER 17 OF 19 CAPLUS COPYRIGHT 2002 ACS

ACCESSION NUMBER: 2000:454356 CAPLUS  
 DOCUMENT NUMBER: 133:61358  
 TITLE: Lithium insertion electrode materials based on  
 orthosilicate derivatives  
 INVENTOR(S): Armand, Michel; Michot, Christophe; Ravet, Nathalie;  
 Simoneau, Martin; Hovington, Pierre  
 PATENT ASSIGNEE(S): Hydro-Quebec, Can.; Centre National de la Recherche  
 Scientifique  
 SOURCE: U.S., 5 pp.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6085015	A	20000704	US 1998-47225	19980325
EP 1134826	A1	20010919	EP 2000-420045	20000314
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
PRIORITY APPLN. INFO.:		CA 1997-2200999 A 19970325		
REFERENCE COUNT:		1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT		
ST	lithium <b>battery</b> insertion electrode orthosilicate deriv			
IT	<b>Battery</b> cathodes Capacitor electrodes (lithium insertion electrode materials based on orthosilicate derivs.)			
IT	30734-07-7P, Iron lithium silicate $FeLi_2SiO_4$ 30734-08-8P, Lithium manganese silicate $Li_2MnSiO_4$ 60218-97-5P, Manganese silicate $MnSiO_4$ 277742-94-6P, Iron lithium manganese oxide ( $Fe_{1.2}Li_{1.4}Mn_{0.1}O_4$ ) 277742-95-7P, Lithium manganese titanium silicate ( $Li_{1.9}Mn_{0.8}Ti_{0.1}(SiO_4)$ ) 277742-96-8P, Iron lithium manganese oxide ( $Fe_{1.2}Li_{0.1}Mn_{0.1}O_4$ ) 277742-97-9P			
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses) (lithium insertion electrode materials based on orthosilicate derivs.)				

L10 ANSWER 18 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 1999:72205 CAPLUS  
 DOCUMENT NUMBER: 130:170706  
 TITLE: Lithium mixed oxide cathode active materials, cathodes  
 using the materials, and lithium batteries using them  
 INVENTOR(S): Amine, Khalil  
 PATENT ASSIGNEE(S): Japan Storage Battery Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 22 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 11025983	A2	19990129	JP 1997-215424	19970704
US 6319632	B1	20011120	US 1999-448504	19991124
US 2002039681	A1	20020404	US 2001-955906	20010920
PRIORITY APPLN. INFO.:		JP 1997-215424 A 19970704 US 1999-448504 A3 19991124		
ST	olivine lithium phosphorus oxide cathode <b>battery</b>			
IT	<b>Battery</b> anodes <b>Battery</b> cathodes <b>Battery</b> electrolytes (Li mixed oxides of olivine structure as cathode active materials for			

high-energy-d. and high-voltage Li batteries)

IT 13824-63-0P 13826-59-0P, Lithium manganese phosphate (LiMnPO<sub>4</sub>)  
 13977-83-8P, Lithium nickel phosphate (LiNiPO<sub>4</sub>) **220333-99-3P**,  
 Lithium magnesium manganese phosphate (LiMg<sub>0.5</sub>Mn<sub>0.5</sub>PO<sub>4</sub>))  
**220334-01-0P**, Lithium manganese nickel phosphate  
 (LiMn<sub>0.5</sub>Ni<sub>0.5</sub>PO<sub>4</sub>) **220334-04-3P**, Cobalt lithium manganese  
 phosphate (Co<sub>0.5</sub>LiMn<sub>0.5</sub>PO<sub>4</sub>) **220334-05-4P**, Iron lithium  
 manganese phosphate (Fe<sub>0.5</sub>LiMn<sub>0.5</sub>PO<sub>4</sub>) **220334-06-5P**, Lithium  
 magnesium nickel phosphate (LiMg<sub>0.5</sub>Ni<sub>0.5</sub>PO<sub>4</sub>) **220334-07-6P**,  
 Lithium manganese nickel phosphate (LiMn<sub>0.5</sub>Ni<sub>0.5</sub>PO<sub>4</sub>) **220334-08-7P**,  
 Cobalt lithium nickel phosphate (Co<sub>0.5</sub>LiNi<sub>0.5</sub>PO<sub>4</sub>) **220334-09-8P**,  
 Iron lithium nickel phosphate (Fe<sub>0.5</sub>LiNi<sub>0.5</sub>PO<sub>4</sub>)  
 RL: DEV (Device component use); PNU (Preparation, unclassified); PRP  
 (Properties); PREP (Preparation); USES (Uses)  
 (Li mixed oxides of olivine structure as cathode active materials for  
 high-energy-d. and high-voltage Li batteries)

L10 ANSWER 19 OF 19 CAPLUS COPYRIGHT 2002 ACS  
 ACCESSION NUMBER: 1998:596036 CAPLUS  
 DOCUMENT NUMBER: 129:205207  
 TITLE: Secondary lithium batteries with lithium and magnesium  
 containing oxide cathodes  
 INVENTOR(S): Igawa, Akiko; Tsuruoka, Shigeo; Yoshikawa, Masanori;  
 Muranaka, Kiyoshi; Komatsu, Yoshimi; Yamauchi, Shuko  
 PATENT ASSIGNEE(S): Hitachi, Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 25 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 10241691	A2	19980911	JP 1997-354358	19971224
PRIORITY APPLN. INFO.:			JP 1996-343041	19961224
ST	secondary lithium battery cathode; lithium magnesium metal oxide battery cathode			
IT	<b>Battery cathodes</b> (compns. and properties of magnesium contg. lithium transition metal oxide cathodes for secondary lithium batteries)			
IT	212075-82-6P, Cobalt lithium magnesium nickel oxide (Co <sub>0.1</sub> LiMg <sub>0.01</sub> Ni <sub>0.9</sub> O <sub>2</sub> ) 212075-83-7P 212075-84-8P 212075-85-9P 212075-86-0P 212075-87-1P 212075-88-2P 212075-89-3P 212075-90-6P 212075-91-7P 212075-92-8P 212075-93-9P 212075-94-0P 212075-95-1P, Copper iron lithium nickel oxide (Cu <sub>0.2</sub> Fe <sub>0.2</sub> Li <sub>0.1</sub> Ni <sub>0.6</sub> O <sub>2</sub> ) 212075-96-2P, Copper lithium manganese nickel oxide (Cu <sub>0.15</sub> Li <sub>0.1</sub> Mn <sub>0.25</sub> Ni <sub>0.6</sub> O <sub>2</sub> ) 212075-97-3P 212075-98-4P 212075-99-5P 212076-00-1P 212076-01-2P 212076-02-3P 212076-03-4P 212076-04-5P 212076-05-6P 212076-06-7P 212076-07-8P 212076-08-9P 212076-09-0P, Iron lithium magnesium nickel tin oxide (Fe <sub>0.2</sub> Li <sub>0.1</sub> Mg <sub>0.02</sub> Ni <sub>0.7</sub> Sn <sub>0.1</sub> O <sub>2</sub> ) 212076-10-3P 212076-11-4P 212076-12-5P 212076-13-6P 212076-14-7P 212076-15-8P 212076-16-9P 212076-17-0P 212076-18-1P 212076-19-2P 212076-20-5P 212076-21-6P 212076-22-7P 212076-23-8P 212076-24-9P 212076-25-0P, Aluminum cobalt lithium nickel oxide (Al <sub>0.1</sub> Co <sub>0.1</sub> Li <sub>0.1</sub> Ni <sub>0.8</sub> O <sub>2</sub> ) 212076-26-1P, Aluminum cobalt lithium nickel tin oxide (Al <sub>0.1</sub> Co <sub>0.1</sub> Li <sub>0.1</sub> Ni <sub>0.7</sub> Sn <sub>0.1</sub> O <sub>2</sub> ) 212076-27-2P, Cobalt lithium manganese nickel oxide (Co <sub>0.1</sub> Li <sub>0.1</sub> Mn <sub>0.1</sub> Ni <sub>0.8</sub> O <sub>2</sub> ) 212076-28-3P 212076-29-4P 212076-30-7P 212076-31-8P 212076-32-9P 212076-33-0P 212076-34-1P 212076-35-2P 212076-36-3P 212076-37-4P 212076-38-5P 212076-39-6P 212076-40-9P 212076-41-0P 212076-42-1P 212076-43-2P 212076-44-3P 212076-45-4P 212076-46-5P 212076-47-6P 212076-48-7P 212076-49-8P 212076-50-1P 212076-51-2P 212076-52-3P 212076-53-4P 212076-54-5P 212076-55-6P 212076-56-7P 212076-57-8P, Cobalt iron lithium magnesium tin oxide (Co <sub>0.7</sub> Fe <sub>0.2</sub> Li <sub>0.1</sub> Mg <sub>0.01</sub> Sn <sub>0.1</sub> O <sub>2</sub> )			

212076-58-9P	212076-59-0P	212076-60-3P	212076-61-4P	212076-62-5P
212076-63-6P	212076-64-7P	212076-65-8P	212076-66-9P	212076-67-0P
212076-68-1P	212076-69-2P	212076-70-5P	212076-71-6P	212076-72-7P
212076-73-8P	212076-74-9P	212076-75-0P	212076-76-1P	212076-77-2P
212076-78-3P	212076-79-4P	212076-80-7P	212076-81-8P	212076-82-9P
212076-83-0P	212076-84-1P, Copper iron lithium manganese oxide (Cu0.2Fe0.2Li0-1.2Mn0.602)	212076-85-2P	212076-86-3P	212076-87-4P
212076-88-5P	212076-89-6P	212076-90-9P, Iron lithium manganese oxide phosphate (Fe0.19Li0-1.2Mn0.801.96(PO4)0.01)	212076-91-0P	
212076-92-1P	212076-93-2P	212076-94-3P		
212076-95-4P	212076-96-5P	212076-97-6P	212076-98-7P	
212076-99-8P	212077-00-4P	212077-01-5P	212077-02-6P	212077-03-7P
212077-04-8P	212077-05-9P	212077-06-0P	212077-07-1P	212077-08-2P
212077-09-3P	212077-10-6P	212077-11-7P	212077-12-8P	212077-13-9P
212077-14-0P	212077-15-1P	212077-16-2P	212077-17-3P	212077-18-4P
212077-19-5P	212077-20-8P	212077-21-9P	212077-22-0P	212077-23-1P
212077-24-2P	212077-25-3P, Cobalt copper iron lithium oxide (Co0.2Cu0.2Fe0.6Li0-1.202)	212077-26-4P, Copper iron lithium manganese oxide (Cu0.2Fe0.6Li0-1.2Mn0.202)	212077-27-5P	212077-28-6P
212077-29-7P	212077-30-0P	212077-31-1P	212077-32-2P	212077-33-3P
212077-34-4P	212077-35-5P	212077-36-6P	212077-37-7P	212077-38-8P
212077-39-9P, Cobalt iron lithium magnesium tin oxide (Co0.2Fe0.7Li0- 1.2Mg0.02Sn0.102)	212077-40-2P	212077-41-3P	212077-42-4P, Iron lithium magnesium nickel tin oxide (Fe0.7Li0-1.2Mg0.01Ni0.2Sn0.102)	
212077-43-5P, Cobalt indium iron lithium oxide (Co0.2In0.1Fe0.7Li0-1.202)				
212077-44-6P	212077-45-7P	212077-46-8P	212077-47-9P	212077-48-0P
212077-49-1P	212077-50-4P	212077-51-5P	212077-52-6P	212077-53-7P

RL: DEV (Device component use); IMF (Industrial manufacture); PRP (Properties); PREP (Preparation); USES (Uses)  
 (comps. and properties of magnesium contg. lithium transition metal  
 oxide cathodes for secondary lithium batteries)